Group 1. Mean period 206·37 days. Ep. 1864 Jan. 17·47.
Group 2. Mean period 212·52 days. Ep. 1880 Sept. 24·21.

Such a difference is well worthy of further investigation. The magnitude at maximum has varied between 7·8 and 9·3.

There does not appear to be any earlier observation of this star than that by Bessel on January 6, 1833, when it was estimated a ninth magnitude. It was not observed either by Lalande or D'Agelet. Prof. Schönfeld's elements in his second catalogue, which assume a uniform period of 208·8 days, would give a maximum on October 6, 1881; according to Mr. Baxendell, it took place on November 21.

Communications from Mr. Knott and Herr Wilsing, of the Observatory, Potsdam, on Ceraski's short-period variable, U Cephei, have appeared in the *Astronomische Nachrichten*. Mr. Knott, from 20 minima observed by him between 1880 October 23 and 1884 March 20 finds for elements—

Ep. 1882 April 19·92641 G.M.T. + 2·4928722 d. E.

Herr Wilsing has collected 61 minima by different observers between 1880 July 3 and 1884 April 9, and finds (similarly expressed)—

Ep. 1881 Nov. 21·34640 G.M.T. + 2·4928646 d. E.

To the suspected circumpolar variables recently named in this column may be added Bradley 392, which figures in our catalogues with various estimates of magnitude from 4·5 (Argelander's Zones) to 7 and 8 (Taylor and Lalande); generally, however, it has been called a sixth magnitude. Doubtless in many, perhaps in most, cases, such discordances arise from errors of estimation, through clouds, &c., or from misprints, but in others, as in the case of Schwerd's magnitudes of U Cephei (6·7, 8, 10 respectively), they are known to have been caused by a real fluctuation in the star's brightness, and hence it seems worth while to examine similar instances of disagreement in the catalogues.

Missing Nebulæ.—In Rümker's Catalogue are two objects observed as nebulæ which were missed by D'Arrest and Auwers. In No. 1542 of the *Astronomische Nachrichten* Mr. G. Rümker has given the particulars of the observations from his father's manuscripts. The first nebula was observed on May 27, 1841, and its apparent place was R.A. 13h. 52m. 38·20s., Decl. + 45° 36′ 13″·8. The Hamburg mean time of the observations was 9h. 31m. 43s. In the *Durchmusterung* we find a star thus—

8·8 ... 13h. 53m. 10·0s. + 45° 31′·7 ... R.

Consequently Argelander identifies this star 8·8 m. with Rümker's nebula. Two questions arise in such a case, and not for the first time: Was a comet projected on the place of Argelander's object at the time of Rümker's observation? or (more improbably), Was the star at that time surrounded by nebulosity which has since become invisible? Bessel, we know, observed a nebulosity on November 8, 1832, in a position where only a star 9·3 m. was subsequently seen by Argelander and D'Arrest. We refer to Rümker's first nebula more especially because its place was not very far from that which might have been occupied by the third comet of 1858, recently shown to be periodical by M. Schulhof. If that comet were at perihelion about 1841 April 21·8, its right ascension might have agreed with that of Rümker's nebula, but the declination would be given by calculation about 6° further north. Whether with the consequent period of revolution, which, assuming three periods, 1841–58, would be near M. Schulhof's lower limit, the action of the planet Jupiter during the first revolution could have caused such difference from the orbit for 1858 as to reconcile the discordance in the observed and computed declination, we cannot say, though it hardly appears likely. Still it may be worth while to mention the above approximate coincidence, as M. Schulhof has searched unsuccessfully for an indication of a former appearance of the comet in question.

GEOLOGICAL NOTES

Triclinic Pyroxene.—Mr. J. J. Harris Teall points out to us that since the paper was written on this subject by Mr. Whitman Cross, to which reference was made in NATURE (*ante*, p. 155), this author has found that, after reconsidering the matter in the light of the researches of Fouqué and Michel Lévy on the optical properties of monoclinic pyroxene, a great majority of the instances cited by him as indicating a triclinic pyroxene are explainable as augite, and that the few cases which still seem anomalous are not in themselves sufficient to justify a reference to the triclinic system. The mistake was made in specimens not cut rigidly parallel to the axis, for it appears that the ellipsoid of elasticity is so situated as to produce very great variations in optical behaviour in sections which are but little inclined to each other. [*Amer. Journ. Science*, No. 151, xxvi. p. 76].

The Brussels Museum and its Work.—The second volume of the *Bulletin of the Musée Royal d'Histoire Naturelle de Belgique* has just been completed by the issue of a fourth fasciculus. In this part geology and palæontology continue to assert their supremacy. M. Dollo supplies a paper on a gigantic fossil bird (*Gastornis Edwardsii*, Lemoine) from the lower part of the Landenian stage at Mesin, near Mons. Having completed the summary description of the Iguanodons, but not being yet in a position to publish his expected large monograph on that important group, he has in the meantime turned to the Crocodilians of Bernissart, of which he furnishes here a preliminary notice. They consist of four individuals capable of division into two well-marked groups—two large specimens indicating an animal about two metres in length, to which he gives the name of *Goniopholis simus*, and two small forms which he regards as belonging to a new genus, named by him *Bernissartia*. M. Ernest Van den Broeck, following up the memoir published in a previous number of the *Bulletin* by his colleague, M. A. Rutot, offers a note on a new mode of classification and of graphic notation for geological deposits, based upon the study of marine sedimentation. The veteran palæontologist, Dr. L. G. De Koninck, contributes an essay on the *Spirifer mosquensis* and its affinities with other species of the same genus.

Geological Survey of Belgium.—Appended to the last number of the *Bulletin of the Musée Royal* is a Report by M. Dupont, Director of the Museum, on the state of the detailed geological map of Belgium, which is being prepared under his supervision. The preliminary examination, which was estimated to require six years, having been completed, the continuous survey of the formations has been prosecuted, each important group being intrusted to an officer specially qualified for its investigation. Nineteen sheets are in the course of preparation for publication. Of these the greater number belong to the remarkable Devonian territory which forms so interesting and important a part of Belgian geology. We see from the map that these sheets are mainly the work of M. Dupont himself. He spent 100 days in the field last year almost entirely among the Devonian rocks. M. Mourlon devoted his time to tracing the area of the Famennian beds. The third section, under the charge of M. Van den Broeck, has made progress among the oligocene Tertiary deposits of Central and Northern Belgium. The fourth section, supervised by M. Rutot, spent half of the season in mapping the Eocene deposits of Limbourg, and the remainder in prosecuting the investigation of Hainault, Brabant, Flanders, and the study of the Upper Cretaceous rocks and base of the Eocene series, the Eocene part of three sheets being finished. Dr. Purves, in charge of the fifth section, has devoted his energy to the mapping of the Jurassic rocks of Luxembourg, and the study of the Cretaceous series of Hainault and Limbourg. The total number of days spent in field-work by the whole staff has been 512.

Geology of Finmark.—Mr. Karl Pettersen continues his contributions to our knowledge of the geology of the Norwegian coast. In a recent memoir (*Archiv for Math. og Naturvidenskab.*, Bd. viii. p. 322) he describes that picturesque tract lying between the mouth of the Kvenangen Fjord and the Refsbotten, which includes the lonely Jökelfjord and Bergsfjord with the islands of Stjernö, Seiland, Sörö, and Kvalö. The greater portion of this area is occupied by various crystalline rocks—gneiss, mica-schist, gabbro, diorite, &c.—referred by the author to the Laurentian series. Above these lie certain certain mica-schists with included beds of limestone, which, under the name of the Tromsö mica-schist group, are assigned to the Cambrian system.

American Jurassic Dinosaurs.—In the *American Journal of Science* (April 1884) Prof. Marsh continues the valuable series of papers which he has contributed to our knowledge of the structure and affinities of the Jurassic Dinosaurs. In part viii. he discusses the carnivorous order Theropoda, two nearly perfect skeletons belonging to which have enabled him to throw some new and most important light on the order. An almost perfect skeleton, above seventeen feet long, has been named by him *Ceratosaurus*, and presents some novel features in dinosaurian organisation. It has a large horn on the skull, a new, strange,

and unexpected type of vertebra, a pelvis with all the bones co-ossified as in existing birds, and a set of osseous dermal plates extending from the base of the skull along the neck over the vertebræ.

GEOLOGICAL SURVEY OF NEW ZEALAND.—Dr. Hector's Report for 1882 has just been received. It contains some additions to our knowledge of the geological structure of the country, but these do not involve any marked alterations in the system of classification already adopted for the formations, but rather tend to establish its general applicability. The Report is specially characterised by the attention paid to the development of the mineral resources of the colony. Mr. S. H. Cox, in compliance with specific instructions, made a careful examination of the gold-fields of the Cape Colville Peninsula and of other mineral tracts, while Mr. A. McKay reported on some antimony and other lodes. The geology, petrography, and palæontology of the islands have likewise received attention. The schists of the Reefton district are regarded as a metamorphic series of Silurian age, as they can be traced into fossiliferous Silurian strata. The granite-porphyries by which they are traversed were intruded into them subsequent to the Devonian rocks. The metamorphic series is covered in some places by the Devonian beds, from which fossils have been obtained at a number of new localities. The auriferous rocks of Reefton are referred to the Matai or Carboniferous formation, and are believed to lie unconformably on the younger Devonian rocks. The Cretaceous and Cretaceo-Tertiary series form a continuous sequence in which coal has long been known to occur. Seams of coal, four to ten feet thick on an average, characterise certain horizons, one seam at the head of the Murray Creek reaching even to thirty or forty feet. The coarse sandstones and grits among which the coals lie are represented as being conformably overlaid by Miocene gravels.

THE AUSTRIAN GEOLOGICAL INSTITUTE.—This admirable organisation, under the energetic management of its Director, F. Ritter von Hauer, shows no sign of any diminution in its activity or of any lessening of the wide scope of its labours. Among the recent numbers of its *Verhandlungen* some interesting papers have appeared, of which may be mentioned: A. Bittner, on the Limestone Alps of Salzburg; E. Tietze, on the occurrence of turquois in Persia; V. Hilber, on the geology of the region between Krzyzanowice and Tarnobrzeg; D. Stur, on some fossil plants from South Wales; A. Böhm, on geo-isothermal lines under mountains. The last two numbers of the *Jahrbuch* are full of important memoirs. Among these reference may be made to Bittner's Report on the survey of the Triassic region of Recoaro; Paul's "Recent Additions to our Knowledge of the Carpathian Sandstone"; Dr. Tietze's essay on the geology of Montenegro, and the continuation of his contributions to the geology of Gallicia.

ON NORTHERN NORWAY UNDER THE GLACIAL AGE

THE Stream of Inland Ice.—From the broad sound between the Kval Island and the province of Finmarken, from which the Troms Island juts forth, the Kval Sound—about 20 km. in length—leads to the open ocean. Outside the Kval Sound several little islands rise from the sea, while beyond the coast is girded by holms and rocks termed the "Skjærgaard." A little south of the Troms Island the Balsfjord, about 60 km. in length, cuts into the land, closed at the bottom by small ridges leading up to the valley in which the Maals River flows, and to the borderland between Norway and Sweden, chiefly through the long Divi Valley. The borderland embraces large mountainous tracts, where peaks rise to an elevation of 1569 m., crossed by dales and high valleys.

In the district described, the local conditions during the Glacial age seem to have been remarkably suited to the formation of large masses of ice. These would have their natural outlet towards the Maals River, through the Divi Valley, and the main stream has no doubt therefrom flown down the Maals Valley, but an arm may have curved more to the north along the northern slope of the Mauken ridge, and by ice-streams from this and from the gigantic high plateaux around the Maar peaks down to the bottom of the Balsfjord. From here the joint stream would have moved further forward to the sounds along both sides of the Troms Island, and thence, through the Kval Sound, over the islands in the Skjærgaard. The channel described has a length of 215 km.

As is generally known, the inland ice of Scandinavia is assumed to have shot far beyond the edges of the peninsula. Thus from Southern Norway the inland ice is believed to have moved forward along the fjords, and filled the entire North Sea as far as England, while further north it has been curved in a more northerly direction, by the ice-streams issuing from Scotland, towards the Orkneys and the Shetlands. It might be supposed that similar conditions existed during the Glacial period in the north of Norway; but from what is known at present there is nothing indicating that the Glacial age has appeared in a more severe form in the southern than in the northern part of Norway; it seems, in fact, from the geographical situation of the land, that the reverse must have been the case. There are besides, as I will presently show, indications which seem to demonstrate that the ice-masses of the Glacial age, at all events in certain parts of Northern Norway, have attained an extent which equals those of Southern Norway, as, for instance, those along the Sognefjord, 1700 m. to 1800 m. in depth. On the high plateau behind the Divi Valley, close to the frontier, the cone of the Great Jerta, built of amphibolitic slate, rises to a height of 1569 m. Nowhere have granite strata been found intercepting this slate. On the top of this peak a large travelled granite block was found, which in most probability has been transported thither from the extensive granite field which stretches forward on both sides of the frontier. The ice which has moved down the Divi Valley must therefore have been very nearly 1600 m. in depth.

There seems every reason to suppose that the channel from the bottom of the Balsfjord to the Skjærgaard has, during the Glacial age, boasted a comparatively uniform depth; and, supposing the sea to have been about 188 m. higher than at present, this channel would nowhere have been deeper than 470 m. An ice-stream moving forward by this channel, and which probably had a thickness of 1600 m., must have moved forward along its bottom, and most probably with a quick motion. If the ice-streams from the south-west of Norway have, as assumed, moved forward, and filled not only the fjords to the bottom, but the entire North Sea to England, we may conclude that this should also have been the case in the channel in question during the Glacial period. If this has been so, marked traces of such an ice-stream would, no doubt, have been visible from the very bottom of the Balsfjord right out to the Skjærgaard; but the researches made here point in a different direction. I will elucidate this by following the channel referred to *from* the ocean coastwards.

About 11 km. from the mouth of the Kval Sound, in the open ocean, lies the little Ris Island, surrounded on south, west, and north by a great number of tiny islands, reaching a height of 100 m. It is formed of a ridge running north to south, in the west sinking abruptly into the sea, but which in the east sinks into a low-lying plain, from which several isolated knolls spring forth. Several of these knolls are connected with the main island by sand dunes, and have most probably at no distant time formed separate holms. Most of the numerous holms surrounding the Ris Island are small, and only rise a few feet above the water. The mineral of which this group of islands is formed is a hard kind of gneiss, greatly interspersed with granite more or less pure; the mineral is, in fact, with its petrographical variations and forms, rather to be considered a kind of granite-gneiss, a name which is given to it in these parts. The strike of the granite strata is, roughly speaking, north to south, with a sudden dip to the east. By its structural condition this mineral should be greatly affected by smoothing and polishing agencies, and also retain the traces of such. Should, therefore, the inland ice at a certain period have moved forward along the Kval Sound, the group of islands around the Ris Island would undoubtedly bear the most patent indications of this action. The polishing phenomena are often met with at lower levels, which either lie within the littoral belt, at high tide under the sea, or rise only a few feet above high tide, but with the sea continually washing over them. At higher elevations these phenomena are rarely discovered. Here severe destructive forces have been at work on the previously polished surfaces, and the numerous sea-birds breeding on these islands have further contributed to the corrosion.

Several circumstances seem, however, to indicate that the polishing in question cannot be referred to the scourings of the ice in the Glacial period, but is of a far later date. The rapid destruction seems in fact to demonstrate that the smoothing must be referred to agencies of shorter duration. The smooth,